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OBSERVATIONS

ON THE

MEANS OF BETTER DRAINING

THE

MIDDLE and SOUTH LEVELS of the FENNS.

Bedford Level

K

By Two Gentlemen who have taken a View thereof.

ADDRESSED TO THE LANDED AND COMMERCIAL
INTERESTS AFFECTED BY THE BILL PROPOSED
TO BE BROUGHT INTO PARLIAMENT.

LONDON,
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[Price Two Shillings and Sixpence.]

To the LANDED *and* COMMERCIAL INTERESTS *of the* FENNS, *which will be Affected by the* BILL *now Intended to be brought into* PARLIAMENT, *the following Sheets are Addreſſed.*

GENTLEMEN,

IT being determined to introduce, at this late Seaſon, a new Bill, profeſſedly for the Relief of the Middle and South Levels, and for the Benefit of Navigation, by laying a further tax upon a Country already exceedingly burdened; I thought it right to ſubmit theſe Sheets to your conſideration, for the following Reaſons:

Firſt, becauſe you who are now called upon for ſo large a Sum, and who, from the injudicious application of your former heavy Taxes, have derived ſo little benefit, ſeem hitherto to have received ſo little information; whilſt any further burden which does not demonſtrably repay you in the end, is as fatal to the pittance which remains to you as the worſt that can follow, ſhould your property remain in the miſerable ſituation your former directors have placed it.

How far the principles and plan of this undertaking have been explained to you, what information you have had of the works, their progreſſion, and their eſtimates, you are the beſt judges.

judges. This was certainly promiſed you fully, publickly, and repeatedly; and upon this information, and from a conviction of their utility, I can alone conceive that any rational man would conſent to a further Tax, or indeed any juſt man approve of a Bill.

Another motive which induces me to communicate theſe Obſervations to you is, becauſe the Gentleman who wrote the firſt is not only allowed to be a man of Science, and whoſe abilities have been proved by his ſucceſs in the moſt difficult undertakings of this nature; but his impartiality may be relied on, as he neither is, nor would be, a ſharer in the execution of what he recommends. The other little Treatiſe is the work of a Perſon who has been employed with ſucceſs in the Fenns, and, being on the point of embarking for the Eaſt-Indies, can have no other view than aſſiſting the Public on this occaſion with his beſt opinion.

The ſyſtems of theſe Gentlemen do not entirely coincide: None of you are rivetted to any propoſition; you will conſider them both; each may contain much uſeful matter, and you will adopt what is beſt.

If it ſhould appear from what theſe Gentlemen, as well as others who can have no connections or views to miſlead you, have ſtated; that the Works propoſed by this Bill are inadequate to the object, that you will ſtill continue to drain upon falſe principles, and that by an additional expence and increaſing the preſent calamity of the Country, by an uſeleſs charge and an accumulation of former errors, which can only gratify the long role of Undertakers and Artificers: In ſuch caſe, Gentlemen, I will preſume that the United and Reciprocal Intereſts of the Landholder and the Merchant will oppoſe ſuch a project with equal firmneſs and candour.

There has been ſomething very unfortunate in the conſtant delay which has attended this buſineſs: It was laſt year intended to be brought into Parliament without any previous arrangement of materials; but it was wiſely poſtponed. The whole Summer ſucceeded, and, after various interruptions, Mr. Elſtobb has at length produced the Levels and Sections of the Ouſe and the Hundred-Foot.

I mean neither to charge Mr. Elſtobb with any neglect, or the Members of the Corporation with any ſiniſter views; I reſpect many of them, becauſe I know them to be Men of perfect Integrity and Honour, and I believe they ſeriouſly meant to retrieve this extenſive Tract of Land, and its Inhabitants from their wretched State: But I lament the uninformed ſituation in which the Country ſeems to ſtand at this hour, at the moment that I hear, that it is likely to be charged with a ſum of 75,000 Pounds in the firſt inſtance, and perhaps this not ſufficient to accompliſh the Works propoſed. As little do I mean to impeach the good intentions and generous Views of Francis Earl of Bedford, in 1630, (which are juſtly celebrated in a late Pamphlet on this Subject): I believe it was the ſame Spirit and Generoſity of Mind which engaged that Earl in ſo arduous, toilſome, and hazardous an undertaking; which moved the hereditary virtues of the late John Duke of Bedford, on all Occaſions, where public Intereſts were to be purſued, and public prejudices to be overcome by Firmneſs and Vigour of Mind: Yet, ſurely, the Hiſtory of Fenn-Government, for many years paſt in the hands of Delegates, Undertakers, and a Species of Men ſtiled Engineers, and the example of ſo many families impoveriſhed by their Blunders and Jobbs, are ſufficient to authoriſe us to be extremely circumſpect upon new Propoſitions and extenſive Powers; without entertaining the leaſt ſuſpicion injurious to the Gentlemen of Influence in the Corporation. It is ſufficient for any intelligent and unbiaſſed man to look for a moment at thoſe ill-placed, ill-proportioned, ſtupendous, tottering Conſtructions, Wellmere Lake Sluice, Salter's Lode

Sluice, and the Old Bedford Sluice; add to this, the Tongs Drain, and its rotten dependencies, and other Works, ſimilar in merit and execution; much-celebrated Slakers where no Waters run, Expenſive Sluices which neither open or ſhut, Lands partially favoured, which are by Nature and by Act of Parliament deſtined for Waſhways, or Receptacles of the Flood Waters, Provincial Indulgencies of running wide Drains into ſmall ones, and Draining one Level at the Expence of another, and above all that long-noted Nuiſance, the Denver Sluice, which, like an ill-ſhapen gigantick Bully, poſted in the avenue of a public place, inſults the Public merely becauſe no one has courage to remove him. I ſay, Gentlemen, theſe inſtances of uſeleſs and expenſive Works, and injuſtice to the Country, which ſtrike every intelligent man upon a fiſhing or fowling party, and would, I am ſure, raiſe the Indignation of an Earl of Bedford, was he to view them with his great Drainage-Act in his hand, fully entitle you to receive the fulleſt Information, and Security, that we ſhall not, as heretofore, remain the annual Sacrifice to ignorant Engineers and accommodating Directors.

Much has been ſaid of the Corporation and Trading Intereſt of Lynn; I ſhould imagine that thoſe Gentlemen ſee their own Intereſt too well to object to a Tax in any caſe whatever, though their Navigation will be improved by the Recovery of the River, and their Commerce by the Fertilization and Population of the Country above them. They ſeem in their Petition in 1651-2 (referred to in the following ſheets) to have known it better than moſt People at that Period. It is but too well confirmed by the Effects of Denver Sluice; THAT ÆRA TO THE FENNS.

The Drainage cannot be abandoned, and the River loſt, without ſuch Obſtacles and Expence falling on the Trade as would Explain, if they wanted the Information, how Mutual the Intereſts of Drainage and Navigation are; on the contrary, I am inclined to think, that if a clear, ſubſtantial Propoſition was made for the Recovery of the River, founded upon undeniable Principles, the Works clearly aſcertained in their Eſtimates, and Progreſſion, and their application, and their extent fixed, that in ſuch caſe the trade of Lynn would hardly wiſh to trample under foot the feeble fence of the poor occupier of Land, which protects his precarious crop and ſtarving family againſt a ſudden inundation, without paying a fair proportion for the advantages the trade would receive. It is ſcarcely to be doubted, but that if the navigation and haling ways were improved, the barges might make three trips where they now make two; the tonnage which Boſton pays is a ſufficient ground for us to form different expectations from the flouriſhing town of Lynn.

It remains therefore only with the Advocates of this Bill, to explain ſufficiently its views, operation, and extent, if they would engage both the Landed and Trading Intereſts on this occaſion; to propoſe nothing but upon the fulleſt information; and to attempt nothing by management or power. It is certain the Country is in a moſt deplorable ſtate; the cauſes are moſt obvious. There can be little doubt but you have about Thirty Feet fall from the junction of the Grant and the Ouſe to Lynn; poſſibly the remedy may be as clear and the means as certain.

I am, my LORDS and GENTLEMEN,

With all due Reſpect,

Your Obedient Servant,

An Impartial Proprietor.

I am inclined to think, that if a clear, *ſubſtantial* Propoſition was made for the Recovery of the River, founded upon undeniable Principles, the Works clearly aſcertained in their Eſtimates, and Progreſſion, and their application, and their extent fixed, that in ſuch caſe the trade of Lynn would hardly wiſh to trample under foot the feeble fence of the poor occupier of Land, which protects his precarious crop and ſtarving family againſt a ſudden irruption, without paying a fair proportion for the advantages the trade would receive. It is ſcarcely to be doubted, but that if the navigation and haling-ways were improved, the barges might make three trips where they now make two; and a ſaving which Boſton pays is a ſufficient ground for us to form different expectations from the flouriſhing town of Lynn.

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I am, my Lords and Gentlemen,

With all due Reſpect,

Your Obedient Servant,

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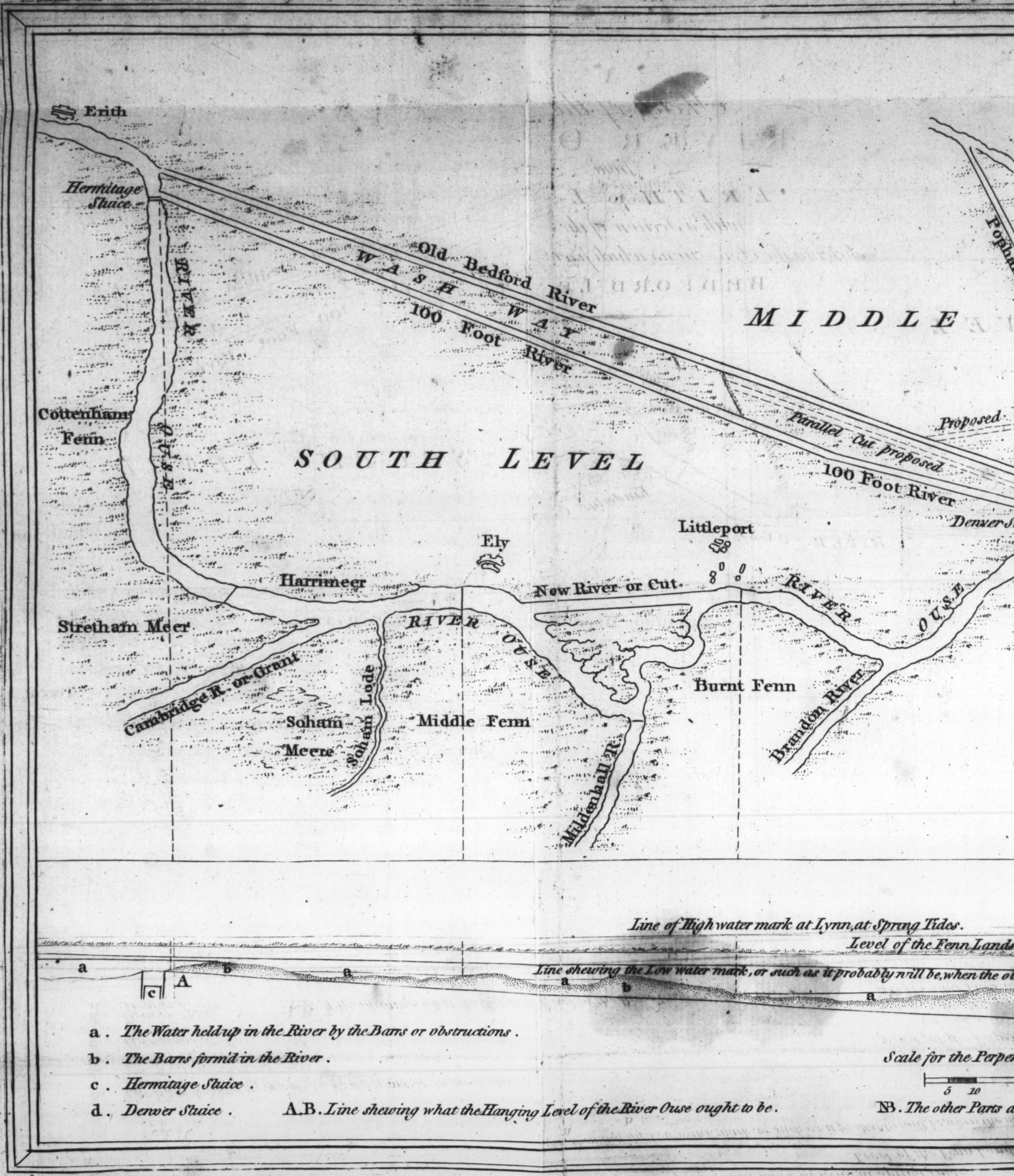


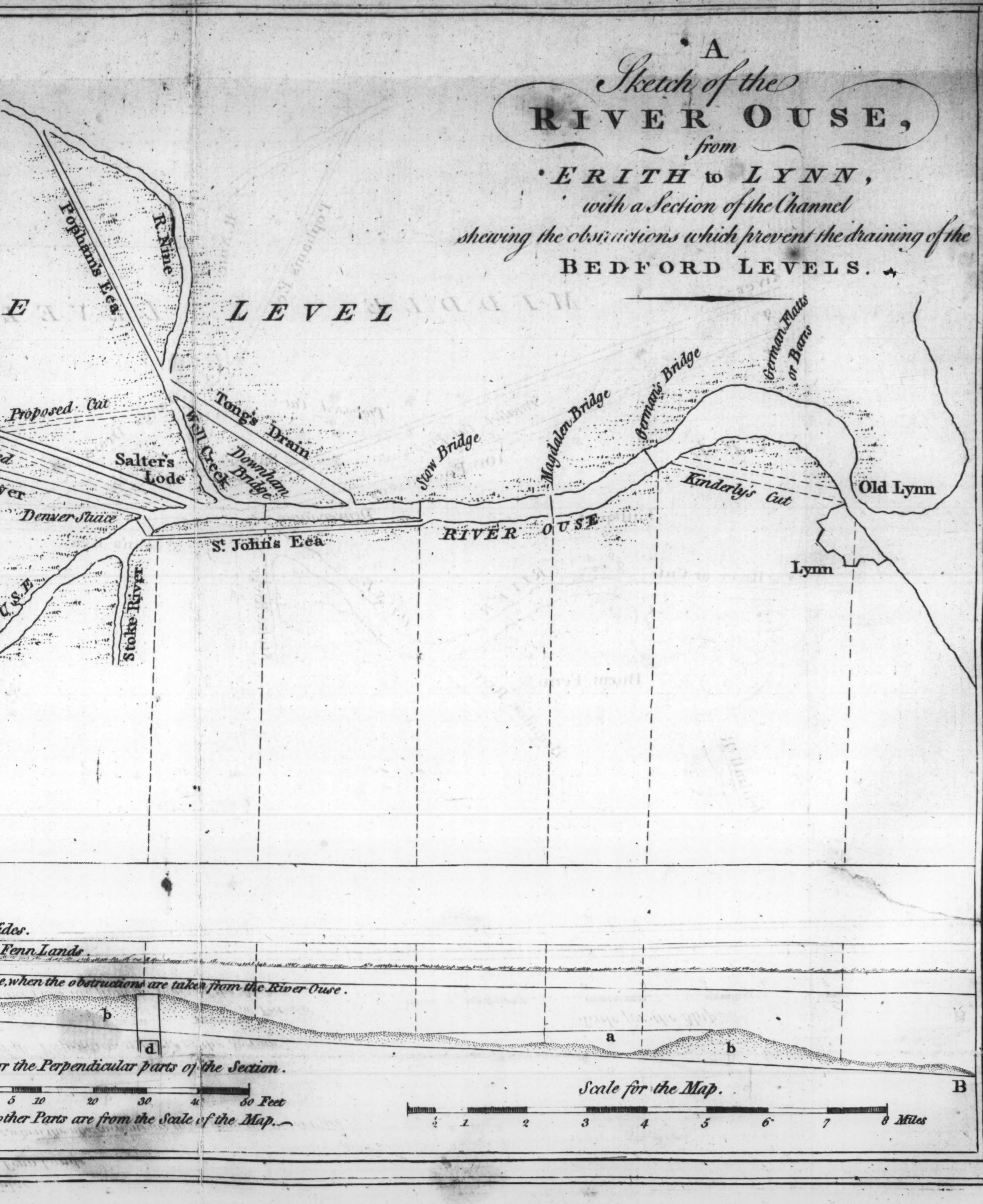
a. *The Water held up in the River by the Barrs or obstructions.*

b. *The Barrs form'd in the River.*

c. *Hermitage Sluice.*

d. *Denver Sluice.* A.B. *Line shewing what the Hanging Level of the River Ouse ought to be.*

NB. *The other Parts a*



A
Sketch of the
RIVER OUSE,
from
ERITH to LYNN,
with a Section of the Channel
shewing the obstructions which prevent the draining of the
BEDFORD LEVELS.

OBSERVATIONS

UPON THE

DRAINING

OF THE

SOUTH and MIDDLE LEVELS of the FENNS.

RECOMMENDED TO THE

Conſideration of the Gentlemen Concerned.

BEFORE the Project of Sir Cornelius Vermuyden for Draining the Fenns (A. D. 1650), that Country was nearly in a State of Nature; the Rivers which admitted the Tides to flow into it were un-imbanked, and of courſe the Lands ſubject to be overflowed. The Floods from the freſh-water Rivers were likewiſe at liberty to ſpread over the Country without any Check, and often drowned parts that the Sea could not riſe to.

Such is the ſituation of all Lands that lie as thoſe do; the Grounds bordering upon the River Thames were originally ſo; which are in general at this time of as Great Value as any in this Kingdom, and as well drained; although, in many parts between London and Graveſend, they are more than Fifteen Feet below High-Water mark.

We now find this River well imbanked, gradually increaſing in breadth towards the Sea, without any Sluices, or other Obſtructions upon it, to hinder the Inlet of the Tides; the Lands, though very low, are drained by the ſhorteſt Diſtances into the River at all times of Low-Water; nothing further being required, as Nature has been only aſſiſted; whereas, in the Fenns, nothing has been done that does not tend to obſtruct her in the moſt complete manner.

Many Schemes were originally offered to the Adventurers for Draining the Bedford-Levels; and ſome of them very wiſely recommended the Preſervation of the Old Rivers by Means of proper Banks, and clearly foretold the bad conſequences that would ultimately ariſe from a Neglect of them. Weſterdyke, a Dutchman of Experience, gave his Opinion, "That the unreſtrained Overflowings of the Rivers was the principal Cauſe "of the ſurrounding this Level; AND THIS BEING APPARENTLY "THE DISEASE, therefore the confining of theſe Rivers within "ſufficient Banks muſt conſequently in reaſon be the cure."

Lord Gorges, then Surveyor-General of the Fenns, obſerved, that "The better way of draining the South Level (for whoſe "benefit alone Sluices were intended) is by Banks, without any "Sluices at all at Denver; according to the certain Rules of "Draining, which is to imbank all Rivers and Brook-Waters, "and never to put Sluices upon ſuch Waters as have a continual Body to preſerve their Channels or Outfalls from "Silting up by Tides."

We find the reverſe of theſe Rules followed in moſt of the Fenn-Works to the preſent time, which conform exactly to the Project of Sir C. Vermuyden. The firſt great Error was in Sluicing the Old River Ouſe near Erith, thereby turning the Water down the Hundred-Foot to Salter's Lode.

It appeared, that by ſo doing the South Level would not be ſubject to be overflowed by the Land Floods, at leaſt by thoſe of the Huntingdon-River; but it was afterwards found that they came down much ſooner by this new River to Salter's Lode than thoſe from the Cambridge and other Rivers could do; and that at ſuch times the Water, inſtead of running towards the Sea, went towards Ely, and that thereby the expectations of the Projectors were not anſwered, as this Evil was found full as great as that they had meant to obviate: Beſides, the Water, by this unnatural courſe, carried great quantities of Silt, &c. into the Old River, which ſeemed to threaten the total loſs of the South Level.

The Adventurers finding (A.D. 1651) that the Hundred-Foot did not anſwer, came to a reſolution to make a Sluice acroſs the Ouſe near Denver, to prevent the unnatural courſe of the Water into the South Level, and at the ſame time to keep the Tides from flowing into ſeveral Rivers, as they formerly did, near Twenty Miles higher up the Country.

Since that Period, the whole South Level has been in a ſtate of Decay, and inevitably muſt be loſt, if ſome proper Project for a general Drainage ſhould not be adopted; by ſtopping the Tides, the Velocity of Water above the Sluice is become too little to keep the River of a proper Depth, the current only running one way, and that very ſlow: Even at the time when the Tides are at the Loweſt, the Water cannot get through the Sluice, owing to it's bad conſtruction, there being but 80 Feet Water-way, where the River is 160 Feet wide. The Foundation of it is likewiſe a manifeſt Obſtruction, it being many Feet above the Hanging Level of the River.

It muſt be obſerved, that ſuch Works, although in the End THE MOST RUINOUS, may for a ſhort time after their execution be of ſome uſe, and are very flattering; as was the Caſe of the Denver Sluice; for we find by Records, now in the Poſſeſſion of Lord Viſcount Townſhend, that Lands about a Century paſt in the Middle Fenn (near Ely) at that time belonging to Sir Thomas Chichley, let upon an Average for ten Shillings per Acre, but they have ſince gradually become of leſs Value, and are now totally drowned, as is the whole of that Fenn.

This ſhews that Tidal-Rivers require the free Indraught of the Sea; the Flux and Reflux being Neceſſary to keep them open, which is very properly obſerved in the following Petition of the Town of Lynn, againſt the Denver Sluice (A.D. 1651-2).

" Sheweth,

" That the Town of Lynn is a very Ancient Port-Town, " and the Inhabitants there have no other Livelihood but by " Navigation; and whereas they were informed that the Earl " of Bedford and his participants have reſolved to ſet Sluices " over the River Ouſe by Denver, or thereabouts, will utterly " deſtroy the Navigation at Lynn, and into Seven or Eight " Counties, unto which the River of Ouſe branches itſelf, for " it muſt be taken for granted, that the Flood cannot flow " higher up the River than the Sluices, whereas now it flows " up to Harrimeer, which is Twenty Miles above the Sluices, " and there it waxeth two Feet Water every Spring-Tide; and " the River Ouſe being filled with the Flood twice every 24 Hours, " comes down with ſuch a force, having the weight of the " Freſhes upon the Flood, that it Scours not only the River of " Ouſe, but Lynn Haven, Ten Miles to Sea-ward from Lynn; " ſo that by that means our Haven and Rivers are very Navi- " gable, and if the Flood be not ſuffered to flow as high as " formerly it hath done, doubtleſs our Navigation from Lynn " to Sea, and from Lynn to Cambridge, and other Counties, " will be Utterly Loſt."

It was ſuppoſed, that the Tides ebb at Stow-Bridge rather ſooner than at Salter's Lode; that the Slaker called St. John's Eau would be advantageous to the South Level, by running the Water that way, which could not diſcharge by the Sluice.

It was accordingly opened, but whether it anſwered, or not, does not appear; we are, however, led to ſuppoſe that it did not, as it was not ſuffered to run many Years.

It is probable that as this work could not in any ſhape benefit the Hanging Level of the River Ouſe, but, by taking off a part of its water, might be of great prejudice to it, the uſe of it was diſcontinued, and now it is quite Silted up.

There is a ſimilar Cutt, called Tongs Drain, upon the River Hone, which certainly is hurtful to that River, particularly to the part of it Called Well-Creek.

Popham's Eau is of a like Nature, and equally to be objected to, for the ſame reaſons; as indeed are all Diviſions of great Rivers; the bad conſequences of which are well explained by a French Author, ſpeaking of the dangerous Diviſions of the Rhine.

I ſhall here give ſome of his Obſervations, in his own words, as they agree exactly with this Subject.

" DU COURS DU RHIN, PAR RAPPORT A SES DIVISIONS DANGEREUSES.

" La Diviſion que ſe fait de ce Fleuve en deux bras ſous Emmerick, et celle qui a lieu dans L'yſſel près d'Arnham, ſont avec les ſaignées qui ſont autour de Dort, ce qui mérite d'être premièrement examiné. La largeur du Rhin entre Emmerick et Cologne ne ſurpaſſe pas, ou ſurpaſſe de fort pue de choſe la largeur du bras qui paſſe à Nimègue. Le Vahal ou bras de Nimègue, ne'ſt guères plus fort et plus large qui celui qui coule ſous Arnham, ne diffère preſque pas de L'yſſel qui baigne Druſi-Burgus, ou Doeſburg."

" CONCLUSION.

" Ainſi, viola le Rhin entier, diviſe en trois bras, et chacun de ces bras, eſt à peu près d'une largeur égale à celle de tout le Fleuve."

" CON-

" CONSEQUENCES DES TROIS PREMIERES DIVISIONS DU RHIN, QUAND SES EAUX SONT BASSES, AUSSI BIEN QUE LORSQU'ELLES SONT HAUTES.

" Les trois bras du Rhin ayant chacun une largeur à pue
" près égale à celle du Fleuve qui les forme, et leur fournit
" l'eau il ſuit néceſſairement."

" 1. Que le Fleuve entier, ou réuni, doit couler trois fois
" plus vîte que chacun de ſes bras, ſi la profondeur et la pente
" de ces bras ſont égales à celles du Fleuve."

" 2. Que chaque bras, n'a en même temps que le tiers de
" l'eau, avec le tiers de la vîteſſe du Fleuve. Auſſi l'expérience
" fait-elle voir que l'eau ne baiſſe pas plus dans les bras que le
" Fleuve."

" 3. Chaque bras du Fleuve a ſon fond et ſes bords ainſi,
" voila trois fonds et ſix Côtes ou Bords : Au lieu, que le Fleuve
" n'a qu'un fond et deux Côtés. Les ſurfaces qui réſiſtent à
" l'eau coulante dans les bras, ſont par-lu triples de celles qui
" réſiſtent dans le Fleuve."

" 4. Le frotement du fond, eclui des bords, et la réſiſtance
" de l'air ſur la ſurface ſupérieure de l'eau, ſont donc dans les
" bras, triples du frotement qu'il y a dans le Fleuve. Le retardement de l'eau eſt donc auſſi triple."

" 5. Si des Vents contraires ſoufflent violamment contre le
" courante de ces bras, ils y trouveront une réſiſtance trois foci
" moins grande que dans le Fleuve : Ils y agiront par conſéquent
" trois ſois plus fort. Ainſi leur effett triple, ſur une vîteſſe
" triplement diminuée, ſera neuf ſoir plus grand."

" Dans ce cas l'eau coulante dans les bras du Fleuve, ira
" relativement 9 ſois moins vîte que dans le Fleuve même :
" C'eſt ce qui ſuſpend et fait hauſſer les eaux dans ces bras."

" PRINCIPALE CAUSE DE L'EXHAUSEMENT DE LEUR FOND.

" De la vient que les Terres et les Sables que les grandes
" eaux Charrient, ſe depoſent ſi aiſément dans le ſond des bras
" du Fleuve au lieu, que le tout eſt entrainé 9 ſois plus vîte
" dans le Fleuve."

" EFFETS DE L'EXHAUSEMENT.

" Le fond des bras s'elève donc 9 ſois plus facilement que celui
" du Fleuve. Les Eaux qui coulent par ſes bras doivent auſſi
" s'elèvent proportionellement et refluer ſur elles mêmes : Ou
" rompre leurs Dignes dans les endroits foibles : Ou enfin paſſer
" par-deſſus ces Dignes."

" AVANTAGES RESULTANTS DE LA REUNION DES EAUX.

" Soin de la Mer, il y a donc 9 ſois plus d'avantage ſur le
" ſeul écoulement des Eaux réunies, que ſur l'ecoulement des
" Eaux ainſi diviſées. Il y a en meme temps trois ſois moins
" de Dignes à faire et à entreteneir : Beaucoup moins d'acci-
" dents et de ruptures ; enfin, un Pays dont le Terrein eſt fort
" cher, s'accroit par cette réunion."

" Près de l' Océan, le retardement cauſé par la Diviſion des
" eaux eſt encore fortement augmenté par le Flux de la Mer,
" qui paſſe du double le retardement qui ſe fait loin de l'Ocean."

" Autre cauſe des Depôts dans le fond des bras du Rhin.
" Le projet de la Saignée qu'on propoſe ajoute cette cauſe ſur
" abondante à toutes celles que je viens de rapporter."

" REMEDE AUX ACCIDENTS QUI RESULTENT DE LA DIVISION DES EAUX DU RHIN.

" Ou veint de voir, que le fond des trois premiers bras du Rhin,
" s'élévoit par le défaut de vîteſſe de leurs eaux, qui permettent
" le dépôt du Sable et de la Terre que les Núges ſondues ſubite-
" ment et les Pluies y apportent."

" En réuniſſant ces trois bras, pour n'en ſaine qu'un ſeule
" Fleuve, on rendroit à ce Fleuve, une vîteſſe conſtante trois ſois
" plus grande que celle qu'il a dans ſes diviſions."

" On lui faciliteroit en même temps, un écurement de ſon
" fond auſſi conſtaniment trois ſois plus conſidérable. Ceci eſt
" ſimple, vrai, et le remède efficace, non ſeulement pour em-
" pêcher les Exhauſements, mais encore pour les détruire peu
" à peu."

N. B. On the 14th page is the tranſlation of this.

Thus far it has been neceſſary to enter into the Hiſtory, not only of the Fenns, but of the General Nature of Draining; we now come to conſider the actual ſtate of the River Ouſe, it being the Natural Drain for a great part of this Country, and in particular for the South Level of the Fenns.

At Lynn, it is about Three Hundred Yards wide; the Spring-Tides in general riſe about Eighteen Feet perpendicular; but upon ſtrong Winds ſetting in with the Flood they have been known to riſe Twenty-Four Feet. A few Miles above the Town, at a part called Germans, the River is very wide, in ſome places it is more than half a Mile acroſs, where the Water is ſhallow, there being Barrs of Sand formed that hold it back upon the Country, which are occaſioned by the too-great width of the River, as the neceſſary Velocity of the Stream to preſerve its proper depth is thereby loſt.

The Bridges between this part and the Denver Sluice are great impediments to the free Currents of the River, and ſtop the Water conſiderably.

The Objections to this Sluice have been already mentioned, as the moſt capital on every Account, as the Waters are held back upon the South Level by it; which was tried in July laſt in preſence of Lord Townſhend, when there was the leaſt Obſtruction, the Seaſon being very dry.

The difference of the Level of the Water on the Ely ſide of the Sluice, to that on the Lynn ſide, was carefully taken with a Good Spirit-Level, and found to be One Foot Six Inches. This is an undeniable proof of the Defects of the Sluice, which at other times are in generel far more hurtful.

It may here be obſerved, that whilſt it remains as it is, the South Level cannot be benefited by any Works the Corporation may undertake; as it is impoſſible to regain the Hanging Level of the River but by a Removal of all Obſtructions: Even ſhould the St. John's Eau ſo far anſwer as to draw the Water from the Level, it in that caſe cannot be ſuffer'd to run, as it would not leave a ſufficient depth of Water for Navigation; therefore, unleſs the Channel can be deepened in proportion, ſo as to be what it originally was, no great benefit is to be expected.

The Map, and Section of the Bed of the River Ouſe from Lynn to Erith, which is annexed to theſe Obſervations, will better explain the Nature of what has been ſtated, and of what will be treated hereafter, than any written Deſcription could do: It ſhews by a Line from the Sluice near Erith, to the Low-Water mark at Lynn, what the State of the Channel ought to be; as alſo, by another above it, the parts complained of. At the ſame time it ſhews, that, could the Obſtructions be removed, the Water in the River might be lower'd, as the Channel, by being deep, would admit of it without Injury to the Navigation, which otherwiſe it would put a total ſtop to. This is clear from the State of the River in July, as at that time there was not Water enough a few hundred Yards above the Denver Sluice to float the Barges; notwithſtanding which, the Middle Fenn was then totally drowned; the Cauſe of which is, that ever ſince the making of this Sluice, the old River, for want of the Tides, has been ſilting up; the Velocity of the Land Floods being inſufficient to keep it open: It therefore follows, that, if a project for a General Drainage is not adopted, this Country muſt pro-

greſſively

greſſively grow worſe, till it is wholly loſt, as all others muſt be that are drained upon ſuch falſe Principles.

Lord Gorges recommended a General Embankment (as has been obſerved) of the Fenns, to confine the River Waters within their own Channels, and the Downfall, or Water of the Land in the Fenns, to have ſeparate Drains to the Outfall, to paſs under the Croſs Rivers that interfere in their way.

The ſame has lately been recommended by Mr. Creaſſy, with this Difference, that he would have the Land-Drains carried parallel to the Main Rivers to the Outfall; and at the ſame time make Dykes round thoſe parts of the High Lands that border upon the Fenns, to turn as much Water as poſſible into the great Rivers. Both theſe projects are very ingenious; but upon inſpecting the Embankment of the Thames, there is the greateſt reaſon to expect (nay, it ſeems to be certain) that the Embankment of the Rivers would alone anſwer every deſireable End; as the Channels would thereby, by having an uniformity of breadth, gain proper depths, and the Low-Water mark would become lower than the Land (as on the banks of the Thames), in which caſe all the Lands would be laid dry at an eaſy expence: but ſuppoſing that ſome parts are not ſo circumſtanced, it would then only be neceſſary to cut Drains to the neareſt places where the Low-Water marks ſhould be found to anſwer.

The River from Lynn to Littleport is pretty well embanked (excepting the improper width at Germans); but higher up, towards Ely, it is totally neglected; there every kind of obſtruction to the running of the Water is ſuffered to remain, and the breadth in many places is twenty times, at leaſt, greater than it ought to be. From Ely to the Hermitage, near Erith, it is in as bad a ſtate; and is equally ſo oppoſite Soham Meere; it is the ſame a conſiderable way up the Grant; which will appear from the ſections of thoſe. But in order to have a ſtill more perfect idea of it, the Country ſhould be viewed; Its bad ſtate for many Years paſt, and proſpects of becoming worſe, have made it abſolutely neceſſary that the Corporation ſhould adopt ſome project for its relief.

They have in Conſequence had ſeveral meetings to conſult together, and form proper plans, &c. to anſwer ſo deſirable an end.

It has always been agreed, that the Outfall of the River Ouſe ſhould be firſt conſidered, as from its preſent bad ſtate, any Works higher up in the Country would be uſeleſs.

The preſent objection to it is underſtood to be at Germans, the Barr of Sand lying much higher than the Hanging Level of the Channel.

A Scheme was many Years ſince propoſed (in a Pamphlet pub-by Mr. Nathaniel Kinderly, upon the Drainage of the Fenns) to leave the Old Channel of the River above thoſe Sands, and carry the water by a ſtraight cut to Lynn, which is what the Corporation of the Bedford-Level now mean to adopt to improve the Outfall; and that is the great and firſt work propoſed in the Plan of the Act to be applied for to Parliament, the Expences being to be defrayed out of the Additional Tax to be laid upon the Trade.

It is not eaſy for any one to aſſert poſitively that this Work will anſwer; the Corporation are led to hope that it will, becauſe a ſimilar thing has been done at Wiſbich, and found beneficial to the Drainage of that Country. We may infer from it, that, provided the Cut at Lynn can be made to bear the ſame proportion to the Ouſe, as the other does to the Wiſbich River, that it MAY IN SUCH CASE anſwer as well. The new Cut at Wiſbich is pretty near the ſame Dimenſions that is the Channel of the Old River; it therefore was only giving the Water a new Direction, equal to what had been quitted, and of courſe it was reaſonable that it ſhould anſwer.

The Wiſbich Cut is, in another reſpect, of great uſe to the North Level, as it directs the Water over the Apron of Gunthorpe's Sluice, which before had been choaked up, and has thereby given a vent for the Waters of the Sluice Drain.

Whereas the width of the preſent Outfall at Lynn, at the narroweſt place, being near Three Hundred Yards, we ought, agreeable to what Nature will require, to give at leaſt the ſame width to the lower end of the propoſed Cut; and the upper part of it ſhould be equal to the Old Channel at the Germans Bridge.

Then it may be ſafe to make it, but not otherwiſe, as under ſmaller dimenſions the indraught of the Tides would ſoon deſtroy its Banks, and might probably carry the Silt, &c. and form dangerous Barrs higher up in the River. There certainly would be great riſk, as the Tides come in very rapidly at Lynn, for in general they are not more than three hours in riſing.

The Corporation of the Bedford-Level ſeem now to have determined that their Project is preferable to the confining the Old River within narrower limits; and have, it is preſumed, fixed the dimenſions, and, without doubt, calculated the expence, which at any rate muſt be very great, to produce any good effects.

Thus far they propoſe for the Outfall; but it will be of very little uſe, if, at the ſame time, they do not execute Works that may reſtore proper Levels to the other parts, quite to the Highlands beyond Ely; as they cannot take the Water from the Rivers, and leave them navigable, without at the ſame time making them deeper; and that cannot be done by what is propoſed in the intended Act.

It is true that Embanking, Widening, and Deepening, of many Rivers are mentioned in a general way; but there is no fixed plan, either as to the progreſſion, or mode; which ought to have been firſt laid down clearly by plans, and explanations: But as that is not done, the Corporation can only, in their Application to Parliament, aſk for a Vote of Credit, to do what may appear to them right hereafter.

It is not to be ſuppoſed that the Number of reſpectable Perſons who compoſe this Body do not mean to lay the Money out in the beſt way; but as very capital Miſtakes have been made in almoſt every Work ſince their firſt Inſtitution, it is natural for the Country that is to pay for the preſent Projects, to expect a clear Explanation of them before they conſent to an heavy new Tax.

After the proviſion for the Outfall, it is propoſed by the Act, that the St. John's Eau is to be opened; alſo a Parallel Drain to be made for the Waſte way by the Old Bedford River, and a Cut by Mr. Savory's Land into Well-Creek; which are works of little conſequence, in the Idea of a Plan of a General Drainage: they cannot, as has been obſerved, be of any uſe towards reſtoring the Hanging Level of the Bed of the River, ſo eſſential to Drainage and Navigation; the Intereſts of Navigation and Drainage are reciprocal and the ſame.

The bad Conſtruction of Denver Sluice ſhould have been attended to in this Act; the moſt inexperienced Engineer in the King's Service would be able to give the Corporation a Plan of a proper Sluice (if they muſt have one there), that would anſwer every purpoſe intended by the preſent, and be without any of its objections: It ſhould occaſionally admit the Tides to flow as formerly into the Ouſe, Brandon, and other Rivers, to maintain the Velocity of Current which is requiſite, and ought only to be ſhut at particular times, when the Hundred-Foot River ſhould require it, or upon very high Tides.

There is a propoſal to turn the River Ouſe through the Cut, or new River (by the means of a Dam), to go over Sandalls by the ſhorteſt Direction, and to communicate again near Littleport. That Idea is certainly right, if at the ſame time the Embankments are carried on, and all the breadths proportioned to the Waters that will paſs through them.

It does not appear that any thing further need be ſaid on this ſubject; we have Works of this nature in England that have perfectly anſwered the purpoſes of Navigation and Draining, where the Grounds are as low and as unfavourably circumſtanced as the Fenns: The Thames from London to the Sea affords us the beſt proofs of this; and could the Proprietors of the Fenns once diveſt themſelves of their local Ideas and Intereſts upon Draining, and concur in a General Plan formed on the ſame Principles laid down in the Embankment of that River, they would ſoon find the inutility of either Sluices, Slakers, or Windmills, towards the Drainage of their Country.

Tranſlation of the French in the Fifth Page.

OF THE COURSE OF THE RHINE, WITH RESPECT TO ITS DANGEROUS DIVISIONS.

The Diviſions of this River into two Branches below Emerick, and that in the Yſſel near Arnham, together with the Canals round Dort, deſerve to be firſt examined into.

The breadth of the Rhine between Emerick and Cologne does not exceed, or ſcarcely exceeds, the breadth of that branch which paſſes by Nimeguen.

The Vahal, or Nimeguen Branch, is very little Deeper or Wider than that which runs below Arnham, and differs very little from the Yſſel by Druſi-Burgus or Doeſburg.

CONCLUSION.

Thus is the Rhine divided into three Branches, and each of theſe Branches is nearly of an equal breadth with that of the whole River, when entire.

CONSEQUENCES OF THE THREE FIRST DIVISIONS OF THE RHINE, AS WELL WHEN THE WATERS ARE LOW, AS WHEN THEY ARE HIGH.

The three Branches of the Rhine having each nearly an equal breadth with the River from which they are formed, and by which they are ſupplied with Water, it neceſſarily follows,

1. That the entire or reunited Stream ought to run with three times the Velocity of each of its branches, if the Depth and Slope of the branches are equal to thoſe of the River.

2. That each Branch receives at the ſame time but one third part of the Water, and conveys it with the third part of the Velocity of the entire Stream; and Experience demonſtrates that the Surface of the Water in the branches is of equal height with that of the River.

3. Each branch of the Stream has its bottom and ſides: Of courſe there are three bottoms, and ſix ſides or banks, to the branches, while the River has two ſides and one bottom only. ---The Surfaces obſtructing the running Water in the Branches are, therefore, triple thoſe in the River.

4. The Friction againſt the Bottom, that againſt the Banks, and the weight of the Atmoſphere upon the upper Surface of the Water, are therefore in the Branches triple the Friction of the River:---Of courſe, the retardment of the running Water is alſo triple.

5. If contrary Winds blow violently againſt the Current in the Branches, the Water will oppoſe three times leſs reſiſtance than in the River; the Wind's action will conſequently be three times greater: So that this triple effect upon a Velocity, diminiſhed by one third, will be nine times greater.

In this caſe, the Stream in the Branches of the River will move with nine times leſs relative Velocity than in the River itſelf, and to this cauſe the riſing of the Water in the branches is to be attributed.

THE PRINCIPAL CAUSE OF THE SILTING UP OF THE BOTTOM.

Hence it happens that the Soil or Sand which are driven by the ſtrength of the Stream, depoſit themſelves ſo eaſily in the Branches of the River, it being driven with nine times leſs Velocity.

THE EFFECTS OF THIS CHOAKING OR SILTING.

The Bottoms of the branches, therefore, choak up with nine times the facility with the Bottom of the River, and of courſe the Water which is conveyed through theſe Branches muſt riſe proportionably, and either reverberate, break their Banks in the weakeſt part, or overflow them.

OF THE ADVANTAGES RESULTING FROM THE REUNION OF WATERS.

At a diſtance from the Sea, there is therefore nine times greater advantages in a ſingle ſtream of Water when reunited, than in the ſtreams thus divided; there is likewiſe but one third of the Banks to make and keep in repair, fewer accidents and breaches, and the ground occupied by the branches is gained.

Near the Ocean the retardment cauſed by the Diviſion of the ſtream is greatly augmented by the flowing of the Tides, which produces a double effect to what is experienced at a diſtance from the Sea.

Another cauſe of the ſilting up of the Rhine. The project of cutting Canals, which is now in agitation, will encreaſe this evil, as it will add another cauſe to thoſe above deſcribed.

THE REMEDY FOR THE ACCIDENTS CAUSED BY THE DIVISION OF THE WATERS OF THE RHINE.

It has been explained, that the bottoms of the three branches ſilt up from the want of ſufficient velocity in the ſtream, which ſuffers an accumulation of Sand and Soil carried down by the ſudden thaws of Snow, and by heavy Rains.

By reuniting theſe three branches into one ſtream, the water would acquire a velocity three times greater than it has in three diviſions.

By theſe means alſo, the effect of ſcouring out the bottom would be tripled. This is a ſimple, true, and efficacious Remedy; and will not only prevent obſtructions in the bed of the River, but by degrees remove them.

THE

Report and Opinion of James Creaſſy,

RESPECTING THE

DRAINAGE

OF THE

MIDDLE and SOUTH LEVELS of the FENNS,

CALLED THE BEDFORD-LEVELS.

AT the Requeſt of the Right Honourable Lord Viſcount Townſhend, Maſter-General of his Majeſty's Ordnance, I have taken a View of the Fenns and Low Grounds in the Middle and South Levels, and alſo of Lynn Haven; and am clearly of Opinion, that the moſt Effectual Way to Drain thoſe Extenſive and Valuable Tracts of Land now under conſideration, is by adopting the Principles herein after mentioned.

I am of Opinion, that the attempting to run the Waters off the Low Lands in the ſame Canal or River with thoſe that flow from the High Country in time of Floods, is inconſiſtent with, and contrary both to Reaſon and Experience, which I flatter myſelf I ſhall be able to prove, in the courſe of this Treatiſe.

The great Rivers, Brooks, and Becks, which bring down the Waters from an Extenſive High Country, much elevated above the Plain to be drained, and conſequently are diſcharged with great Velocity at their firſt entrance into the Fenns after heavy Rains, or the melting of great Snows; and finding there but little Fall for many Miles together, the Current becomes languid and ſlow till theſe Flood Waters riſe much above the ſurface of the Lands to be drained; and therefore it becomes utterly impracticable to drain thoſe Lands into ſuch Rivers immediately where ſuch Lands abutt thereupon, during the time the Floods are coming down, except ſuch Lands as lie very near the Outfall, where the inclined Plain formed by the running of the high-land Waters, falls below the ſurface of the Land; and it is well known that theſe Flood Waters are in the forementioned ſtate for many Months every Year.

The Water in the River Ouſe, and ſeveral other Rivers, were conſiderably higher than the ſurface of many thouſand Acres of Low Lands at the time I viewed the Levels, which was in the middle of July, particularly near the High Country; and therefore thoſe Lands that lie remote from the Outfall, become almoſt perpetually drowned, as their preſent Outfalls are too high up thoſe Rivers, and as ſuch are over rode by the High-Land Waters. All attempts hitherto made to perform a General Drainage have proved abortive, becauſe Plans have been purſued that were founded upon fallacious Principles.

For though I admit the Widening and Deepening of Rivers is an advantage to the Draining a Country, it being evident that a River of One Hundred Feet Wide and a given Depth, will run double the quantity of Water in the ſame time, that one of Fifty Feet wide and the ſame depth will do, nay, ſomething more, as the reſiſtance on the ſides will be leſs in Proportion; but ſtill the Waters muſt riſe to the ſame height at the Upper End of the ſame Rivers, before they will run with equal Velocity, allowing for the before-mentioned reſiſtance.

I ſhall here conſider all running Waters to form an inclined Plain, though, mathematically ſpeaking, they form an inclined Curve, which has one end nearer the Centre of the Earth than the other, and the Velocity of all running Waters will be in proportion to the Declivity of the ſurface they run upon, and therefore it muſt appear demonſtrative, that two or more Rivers may be made parallel to each other, and yet have different Falls in a given diſtance; and ſtill theſe Rivers may be united, and the Waters run together at a given Point. But, to demonſtrate this more plainly, let A B repreſent the horizontal or level line from the top End of the higheſt River, and B C the Fall of Twenty Feet, then if the Bottom of the River be made with a regular Declivity, the ſurface of the Water when running, will form the inclined Plain A C.

Then ſuppoſe another River made Parallel to this, whoſe Fall in the ſame Diſtance is only Ten Feet, and that if the bottom thereof be made with a regular Declivity, the Surface of the Water when running therein will form the inclined Plain D C, and the Waters of the lower River will unite with thoſe of the higher, and both run together at the Point C; tho' it would be impoſſible to run the waters out of the lower River into the higher at the upper end A D, becauſe the Surface of the one is higher than the other by Ten Feet, nor will it run into the River any where till it gets below the Point F.

It is equally plain, that if the Waters in the upper River are running, and thoſe in the lower are ſtopt at the lower end, and have no communication with each other till they arrive at the Point E, which is Level with the upper end D, they will riſe to that Level, and have a Fall of 10 Feet from E to C.

From the abovementioned propoſitions it is evident, that the

Waters coming from the High Country (which I conceive to be Nineteen parts out of Twenty of all the Waters that drown the low Lands in Queſtion) may, if they are confined in their Courſes by ſtrong Banks, be higher by ſeveral Feet than the low Lands adjoining, and yet thoſe Lands may be well drained, by having Drains cut Parallel to the ſaid Rivers, and carrying the low-land Waters down to a lower part of the Outfall, without letting them communicate at all with thoſe coming from the high Lands, till the inclined plain formed by the running of the high-land Waters is lower than the low Lands to be drained.

The Plan that I would recommend for the more effectual draining of the abovementioned Part of the Country, is, firſt, to build two Sluices a little above Lynn, one on each ſide the River Ouſe; to be each Sixty Feet clear Water way, and the Floors thereof to be Five Feet below low-water Mark at Lynn, with pointing Doors to ſtem the Tides, and to be erected at ſuch Points of the River, as that both Ebb and Flood may paſs cloſe by their Mouths, in order to ſcour away the Silt, &c. and keep the Paſſage clean.

I recommend a Drain to be cut from the Sluice of the Weſt ſide Parallel to the River Ouſe, up to Salter's Lode, Eighty Feet at the Top, and to ſlope a Foot and a half on each ſide for every Foot in depth, and to be made as deep at the lower end as the floor of the Sluice, and to lay half the Earth ariſing therefrom on the Bank of the Ouſe, and the Remainder on the oppoſite ſide the Drain in Bank faſhion, and to cut a Drain from the Sluice on the Eaſt ſide, in as ſtraight a Direction as the Nature of the Country will admit of, to the lower end of St. John's Eau, and to ſcour out the ſaid St. John's Eau, and cut from the upper end of the ſame to Stoke River, parallel to the Ouſe, of the Dimenſions and in the ſame manner as the Drain recommended on the Weſt ſide.

I alſo recommend a Drain to be cut Parallel to the River Ouſe, on the Eaſt ſide, from the ſaid Stoke River to the Grant or Cambridge River, and from thence up the ſide of the ſaid River to the High-Lands, 40 Feet wide at top, and to ſlope a Foot and an Half on each ſide for every Foot in depth, and to be Seven Feet deep at the upper end, and the bottom to form a regular Declivity from thence to the Sea Sluice, recommended to be built near Lynn; all the Earth ariſing from the ſaid Drain, to be applied in heightening and ſtrengthening the Bank of the Ouſe and Grant.

I likewiſe recommend the Stoke, Brandon, Mildenhall, and Soham Rivers, to be ſtrongly embanked up to the high Lands, by cutting a Parallel Drain on each ſide the ſaid ſeveral Rivers, of ſuch Dimenſions as will produce Earth ſufficient to make the Banks of equal Height to the Bank propoſed to be made on each ſide the Ouſe; and of ſufficient Strength to confine all the Waters coming from the high Country in their ſeveral Channels down to the Ouſe.

I alſo recommend ſunken Tunnels to be laid under the Stoke, Brandon, Mildenhall, and Soham Rivers, in order to diſcharge the Socage and Downfall Waters from off the low Lands and Fenns, lying on the Eaſt ſide of the Ouſe, ſo that thoſe Waters may have a free Paſſage down the ſide Drain propoſed to be cut parallel to the River Ouſe to the Sea Sluice near Lynn, without communicating at all with any of the High-Land Waters.

On the Weſt ſide the Ouſe, from Denver Sluice to a little above where the Brandon River falls in, the Land adjoining the Ouſe Bank is conſiderably higher than the reſt of the Fenns, and ſeveral Houſes, Barns, &c. built thereon; I therefore recommend the Ouſe Bank to be repaired along that Part with Earth taken from the Forelands of the River; it will take about Five Floors in every Twenty Feet in length, reckoning Four

Hundred Cube Feet to the Floor; and from thence I recommend a Drain to be cut parallel to the Rivers Ouſe and Grant, up to the high Lands on the Weſt ſide, in the ſame Manner and of the ſame Dimenſions as that propoſed to be cut on the Eaſt ſide, and to diſpoſe of the Earth in repairing the Bank of the ſaid Ouſe and Grant.

The next thing I recommend is, to cut a Drain on the Eaſt ſide the Hundred-Foot River, and parallel thereto, from Denver Sluice to the upper end at Erith, Thirty Feet broad at the top, the ſame ſlope on the ſides as before recommended, Seven Feet deep at the upper end, the bottom to be made with a regular declivity, and the Earth to be applied in heightening and ſtrengthening the Bank of the Hundred-Foot River.

N.B. There muſt be a Drain from the loweſt end of the Drain propoſed to be made on the Weſt ſide the Ouſe, to communicate with this laſt-mentioned Drain; and therefore it ſhould be made wider from the lower end to the junction.

I likewiſe recommend the ſide Drain to be continued from the upper end of the Hundred-Foot River, up the Eaſt ſide of the Ouſe to the high Lands, and apply the Earth in repairing the Ouſe Banks.

I recommend a ſunken Tunnel to be laid under the River Ouſe, immediately above Denver Sluice, ſo that all the Socage and Downfall Waters of the Fenns lying between the Hundred-Foot River and the Ouſe may paſs freely down the ſide Drain to Lynn, without communicating with the high-land Waters.

I alſo recommend a ſtrong Bank to be made on the Weſt ſide the Hundred-Foot River, by taking down the Weſt Foreland, fifty Feet wide, and as deep as the Workmen can get at low-water Mark, and to lay the ſaid Bank at leaſt a hundred Feet from the Prick of the Spade, to give an ampler paſſage to the Huntingdon Waters; and then the Old Bedford will ſerve as a Drain to diſcharge the Socage and Downfall Waters of the Fenns.

The next thing I recommend is, to collect all the high-land Waters that can poſſibly be collected, by cutting catch-water Drains along the Skirt of the high Lands, but high enough up to diſcharge part of the Waters into one embanked River, and part into another, ſo that no high-land Waters be ſuffered to flow into the Fenns and low Grounds to be drained.

Though the Diſtance along the Skirt of the Hills is very conſiderable, I apprehend it will not be attended with ſo much Expence as ſome may imagine, as the Drains require to be but of ſmall dimenſions, and as ſuch will be all caſt-work, which is much cheaper than barrowing.

I recommend the River Nyne to be widened and deepened from Salter's Lode Sluice to Popham's Eau, and to widen and deepen the ſaid Popham's Eau, to its junction at its upper end with the ſaid Nyne, and to widen and deepen the Nyne from thence to March, ſo that the ſaid River Nyne and Popham's Eau may be Fifty Feet wide at the Top, and the ſame ſlope on the ſides as the Drains before mentioned; and to be Eight Feet deeper at a medium than the Low Lands to be drained, and its bottom to be made with a regular declivity, and to communicate at the loweſt end with the Drain propoſed to be cut by the Eaſt ſide of the Ouſe, ſo that the waters may be carried down and diſcharged at Lynn, along with thoſe of the Old Bedford; and from March, I recommend the Nyne to be widened and deepened to its junction with Whitleſey Dike, ſo that it may be Forty Feet broad at the Top, and Seven Feet deeper than the adjoining Low Lands, at a medium.

Theſe are the great Works which I conceive neceſſary towards compleating a General Drainage of this extenſive and fruitful Country. There are ſeveral other Works of an inferior kind needful; but I look upon thoſe as ſecondary, and of a local and private nature.

N. B. I have not ſeen the upper part of the South Banks of

Morton's Leam; I therefore cannot ſay what may be wanting there; but if it is not ſufficiently ſtrong, I ſhould recommend it to be ſtrengthened in the ſame manner as the Ouſe.

I ſhall now proceed to make ſome remarks upon the circumſtances and advantages that will of courſe attend the adopting the Plan here recommended. In the firſt place, I am ſatisfied that Low-Water mark at Lynn is conſiderably lower than the Low Lands to be drained; and it is ſelf-evident, that the ſurface of the Water at that point muſt be lower than any part of the River upwards during the time of Ebb; otherwiſe the Water in the reſpective Rivers would not run down to Lynn. It is equally plain, that the ſurface of the Waters in the ſeveral Rivers gradually riſes all the way from Lynn up to the High-Lands: Even when I viewed the Fenns in July, the ſurface of the Water in the Ouſe, &c. was above the ſurface of the Lands to be drained, at the Mildenhall River, and ſo continued higher above the lands till I came to the High Country; and they muſt be much more ſo in the time of Floods. It therefore becomes impoſſible for the Low Lands to drain into theſe Rivers; but as thoſe Lands lie much higher than Low-water mark at Lynn, it is evident they will drain there, if they have ſeparate channels to convey their Waters, independent of thoſe coming from the high Country, as they will run there at all ſeaſons of the Year, notwithſtanding the Floods in the embanked Rivers may riſe conſiderably higher than the ſurface of thoſe Low Lands, eſpecially ſuch as lie at a diſtance from the Outfall.

That Lynn is a ſpacious Outfall, capable of receiving and diſcharging theſe united Waters, is indiſputably true; and I am well ſatisfied, that, if all the Flood Waters coming from the high Lands were properly embanked and confined in their Channels, they will come down quicker, and conſequently act with more force in driving out the Silt and matter brought in by the Tides; and thoſe, united with the Fenn-Waters near Lynn, will ſcour out and keep a deep Channel to Sea, which is but a ſhort diſtance from Lynn Harbour; beſides, the Denver Sluice, in this caſe, will become uſeleſs, and as ſuch may be removed, and the Materials applied to other uſes, and let the indraught of the Tides flow up the Ouſe as it formerly did; and then its reflux, together with the Flood Waters in the Embanked Rivers, will come with ſuch force paſt the mouths of the Sluices, as will greatly improve the navigation and Harbour of Lynn.

The next thing is, I am perſuaded the works here recommended will be executed at leſs expence than thoſe of ſcouring and widening, deepening and embanking, the ſeveral Rivers that bring down the Flood Waters, if the Banks of thoſe Rivers are made equally ſubſtantial; for the vaſt expence of making dams acroſs theſe ſpacious Rivers, turning the waters into other courſes, or over the Fenns, during the time the works are executing, and the immenſe expence of milling the water out of ſuch ſpacious Rivers, before the workmen can begin to work, and during its continuance, will in a great meaſure be ſaved, by adopting the plan here recommended; and I do declare it as my opinion, that it is not practicable to dig the preſent Rivers ſufficiently capacious to reduce the Flood Waters below the ſurface of the Low Lands to be drained, even in ordinary ſeaſons, at any expence that can be borne by the united intereſts of the Lands and Commerce; and if it was practicable, no one, I believe, will be bold enough to affirm, that the Tides would not bring in the Sands again, and ſoon cauſe the ſame obſtructions that are now complained of; and it muſt be allowed, if the Waters were ſo lowered in the ſeveral Rivers as to give all the Lands an opportunity to drain into the ſame, there would be ſo much leſs fall to Lynn, as the ſurface of the waters was reduced at the upper end, and of courſe the Flood-waters would diſcharge themſelves with leſs force, and have leſs power to drive out the ſands and other matter brought in by the tides; and therefore it is preſumed the ſands would encreaſe in proportion, till they would pen back the waters, and cauſe them to riſe to their uſual height.

On the other hand, as thoſe Flood-waters come from a country much elevated above the Plain to be drained, and even much above the flow of the higheſt Tides, it is evident, that all ſuch waters may be conveyed between ſtrong Banks, to over-top the Tides at high-water Mark, if neceſſary. But the Banks in all theſe Levels are the weakeſt where they ſhould be the ſtrongeſt; viz. near the high Country, where the waters, according to the nature of things, muſt riſe the higheſt. Every perſon muſt ſee, that the more theſe Flood-waters are confined, and the higher they are embanked, the greater will be the velocity, and the greater will be the effect in driving away the Silt and other matter brought in by the Tides, on one hand, and the Soil brought down by theſe high-land Rivers, will be kept in motion and carried to the Sea, on the other: And this is a circumſtance of no ſmall importance, as it is well known that the Tides bring in and leave ſuch vaſt quantities of Silt in dry Seaſons, which choaks up the Rivers ſo much, that, before the Floods (when they come) can cleanſe out this Silt, and make a paſſage to ſea, the whole Country is deluged.

The next thing is, the Country will be rendered dry as the Works advance upwards, and as ſuch will become cultivated and improved, and the Inhabitants will be ſatisfied of the utility of the undertaking, and proſecute it with more vigour.

It is alſo to be conſidered, that almoſt all thoſe vaſt ſums that are now ſpent to very little purpoſe in partial Drainage, by engines and private partial embankments, will be ſaved; which, of all other methods of Draining, is not only the moſt expenſive, but in the end never fails to bring deſtruction on a Country where ſuch a vaſt extent of Land depends upon one general Drainage; and ſuch engines and partial Drainage ſhould never be made uſe of, but to drain Lakes or Meers, where there is no Fall to Sea, when a general Drainage can be executed.

The next thing is, the Navigation and Trade of Lynn, &c. will be prodigiouſly increaſed by having ſo many more thouſand Acres of Land cultivated and inhabited, that now is, comparatively ſpeaking, a loſt and undone Country; and, by having more commodious Haling Ways up the ſides of the ſeveral embanked Rivers, will cauſe greater diſpatch in Buſineſs. Boſton is now become a flouriſhing place of trade and commerce, ſince the Drainage and Cultivation of the Fenns adjoining; and the ſame Cauſes will produce the ſame Effects at Lynn, or any other place.

The next Advantage is, that, by adopting the above Plan, Leading Drains will be cut with little more Expence than what would be required for embanking the Rivers, which, was the other practicable at any Expence that could be borne, there then would want Leading Drains to carry the Fenn-Waters into the Rivers, beſides a great number of Sluices, Tunnels, &c. So that the Plan here recommended will be doing Two Works at the ſame Expence.

The Plan above recommended is not only adapted to drain the low-lands in queſtion, but the ſame Principles will ſerve to drain moſt, if not all, the Fenns and low-lands in England; for there are but few, if any, in this Kingdom, but what have a fall to the Sea, and that fall is the ſame in Winter as in Summer; the reaſon of all ſuch Lands being drowned, is becauſe the waters coming from an Extenſive High Country, either immediately break out of their Channels, or that they riſe too high, and over-ride the Socage and Downfall waters, at the places where ſuch waters are intended to drain into the Rivers, which bring down ſuch high-land waters.

That the Plan here recommended is practicable, and will be attended with the ſalutary Effects before mentioned, can be proved by Experience, which far exceeds the Opinions of the ableſt Engineers; for of all the Demonſtrations and Arguments that can be made uſe of, none are ſo ſatisfactory and explanatory as Experience; and for this I ſhall refer any Gentleman intereſted to view Holland Low Fenn, and the low-lands adjoining the ſame, which are drained upon the principles above mentioned; viz. Separating the high-land Waters brought down Kyme Eau and the River Witham from the Socage and Down-fall Waters of the Fenns and low Grounds, and carrying theſe Waters to a lower part of the Outfall, and diſcharging them into the ſaid River Witham below Boſton. Every Winter furniſhes us with the unſpeakable Utility of this Plan; for the Waters in the River Witham and Kyme Eau, near Chappel-Hill, during the Winter Seaſon, is higher by ſeveral Feet than the Surface of the low-lands adjoining thereto; and at the ſame time thoſe Lands are dry and well cultivated below; and ſolely owing to the method of running the Waters in independant Channels Eleven Miles; and all thoſe Waters of the Kyme Eau, the River Witham, and the ſaid low-lands, unite and run together when they get below Boſton, though it would be impoſſible to run the Waters of the low-lands into the River Witham near Chappel-Hill in the Winter Seaſon, becauſe the Flood Waters riſe ſeveral Feet higher there than the Surface of the Lands to be drained. Any Gentleman that has ſeen Holland Fenn, and the low-lands adjoining the ſame, (which uſed to be the Sink-hole of all the Country,) can teſtify that thoſe Lands are now become well drained and cultivated, abounding with Corn, Cattle, and Inhabitants, while many thouſand Acres of other Lands, that might be equally as well drained by adopting the ſame Principles, are almoſt perpetually drowned. And by collecting and embanking the Flood Waters of the High Country, the Haven at Boſton is every Winter ſcoured out to its ancient hard Clay Bottom, and Ships of conſiderable

Burden lie afloat where people have walked acroſs in their Shoes at low-water, and not got wet-ſhod; and large Ships can now ſail where it before was difficult for Barges and Lighters to paſs; and all this Alteration is cauſed by the Current in a ſhort ſpace of time, though the works that are propoſed to be done are yet far from being finiſhed.

I therefore would humbly adviſe the Noblemen and Gentlemen intereſted in draining the Middle and South Levels of the Fenns, to take Experience for their future Guide, and no longer depend upon the fallacious and ill-grounded Reports of ſelf-intereſted and deſigning Men, whoſe Buſineſs has ever been to multiply the difficulties of a General Drainage, that they might the more readily fatten upon the ſpoils of the Country, by multiplying Jobs for themſelves and Friends. Among thoſe vultures of Society that have infeſted this part of the Country, are the Engine-Builders and Jobbing Engineers, who have combined together, to the almoſt-total Ruin of the Landed Intereſt in thoſe Fenns.

I had an Opportunity of ſhewing Lord Townſhend, on the Spot, the Utility of the Principles here laid down, by a ſmall Experiment. The waters of the River Ouſe and Mildenhall River were ſeparated from thoſe of the Fenns on the Eaſt ſide, by a Bank, and had no Communication with the River waters till they emptied themſelves into the Ouſe, near the mouth of the Brandon River; we took the Levels from the Surface of the water in the Ouſe, at the Junction of the Mildenhall River to the Surface of the water in the Fenns adjoining, and found the latter Two Feet Nine Inches and a Half lower than the other, though they were only ſeparated for about Four Miles, and at a time of the Year when no Floods were out; the Lands on one ſide the Mildenhall were dry, and thoſe on the other drowned. I ſhould think this Experiment, though in Miniature, might ſufficiently ſhew every Perſon what great advantages might accrue by adopting the ſame Principles, only on a larger Scale, for draining the whole Levels.

From the little Time I had to ſpend in thoſe Fenns, and for want of proper Levels and Sections of the Rivers, I could not be ſo particular in my Obſervations as I could wiſh; nor would I wiſh an Act of Parliament to be obtained on this Report, without firſt taking the Opinion of Mr. Jeſſup, Mr. Smith, or ſome other ſkilful Engineer.

I have converſed with Mr. Elſtobb, the Engineer employed by the Corporation of the Bedford-Levels, on the above plan, and he by no means ſeems to approve of it. His firſt objection was, the waters in Lynn-River would revert up the Side Drains, if there was not Pointing-Doors: In anſwer to this objection, I told him, there muſt be a Sluice with Pointing-Doors to ſtop the Tides from flowing up theſe Drains; but then, ſays he, there will be ſuch a quantity of high-land waters come down the River as will keep the Pointing-Doors ſhut, and by that means prevent the ſide drains from running. In anſwer to this, I ſay, that low-water mark, where the Sluices are propoſed to be built, is much lower than the low-lands to be drained, and therefore that objection will not hold; which Experiment has ſufficiently ſhewn at Boſton. But then, ſays Mr. Elſtobb, we have a precedent in the Hundred-Foot River; for the waters came down it in ſuch quantities, that they reverted up the Ouſe, and obliged the Corporation to build Denver Sluice, and ſince Denver Sluice was built, theſe waters kept the doors ſhut for ſeveral days together, and prevented all the Lands above it from draining into the Ouſe. This I admit to be true; but what is this owing to? To three Cauſes; the firſt is, that the ſurface of the waters ſo high up the River as Denver Sluice, is ſeldom ſo low as the low-lands to be drained; which I think I may venture to ſay, will never be the Caſe ſo low as Lynn.

The next thing is, the Hundred-Foot waters come down from Erith in a ſtraight line, and the Ouſe waters come many miles round, and conſequently the others, getting down firſt, riſe above thoſe of the Ouſe, and keep the door ſhut. Another thing is, that the River below the Hundred-Foot, particularly about German's Bridge, is not of Capacity ſufficient to receive all the Waters that empty themſelves out of the ſeveral ſpacious Rivers; viz. the Hundred-Foot, Old Bedford, Nyne and Ouſe, which all come in near the ſame Place; and therefore as theſe Waters cannot find a ſufficient paſſage downwards, thoſe that come down the neareſt way, and get down firſt, will in Time of floods revert up the others, or keep the Pointing-Doors ſhut till the other waters come down and riſe to a ſufficient height to force their way to Sea, through the paſſage that is inſufficient to receive them as they come down. But this can never be the Caſe, if the waters are carried down to Lynn in the manner propoſed; they will there diſcharge themſelves, into a ſpacious Outfall that opens into the Sea a little below.

But then, ſays Mr. Elſtobb, by dividing your waters, you ruin your Outfall.

In anſwer to this objection, I ſay, the Outfall will then be at Lynn for all the Lands to be drained, and will there be united with all the other waters, and conſequently will act with their united force to keep that Outfall clean of the Sand, &c. brought in by the Tides; beſides, the living waters being ſtrongly embanked, will come down with greater Velocity than they do at preſent; this, added to the Influx and Reflux of the Tides, muſt drive out the matter, and keep Lynn-Harbour much cleaner that it is now.

JAMES CREASSY.

THE END.